PanGEO INCORPORATED
Geotechnical & Earthquake Engineering Consultants

July 30, 2024 *(revised November 21, 2024)*
File No. 24-228

Mr. Scott Lien
Kamiak
1700 Westlake Ave N, Suite 200
Seattle, Washington 98009

Subject: **Infiltration Test Report**
Proposed Bullfrog Apartments
4240 Bullfrog Road, Cle Elum, Washington

Dear Mr. Lien:

As requested, PanGEO, Inc. is pleased to present this report summarizing the results of our infiltration test program completed for the proposed Bullfrog Apartments project located at 4240 Bullfrog Road in Cle Elum, Washington. Our scope of services consisted of reviewing readily available geologic and geotechnical data in the project area, excavating five test pits at the site, conducting one small-scale pilot infiltration test (PIT), a laboratory testing program, and presenting the test results and developing the recommendations in this report.

SITE AND PROJECT DESCRIPTION

The project site is an approximately 1.72-acre lot located at 4240 Bullfrog Road in Cle Elum, Washington (see Figure 1, Vicinity Map). The site is bound by an asphalt paved access drive to the north, by Bullfrog Road to the west, and by Cle Elum-Roslyn school district properties to south and east. Based on our field observations, the existing site grade is generally level. The site is currently occupied by multiple one-story model homes and an asphalt paved roadway that passes through the site.

Based on a review of the preliminary site plan, we understand it is proposed to remove the existing structures and to construct two workforce housing buildings at the site. As

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currently envisioned, the proposed buildings will be 2-story at grade structures of lightly loaded wood frame construction. Based on the current design information, we anticipate that temporary excavations for the foundation construction will be on the order of about 2 to 3 feet deep.

We understand that infiltration facilities may be installed as part of the proposed development, if feasible. Based on preliminary information provided by the project civil engineer, the proposed infiltration system may consist of dry wells or infiltration trenches in drive areas. The approximate layout of the proposed development is shown in Figure 2, Site and Exploration Plan.

SUBSURFACE CONDITIONS

SITE GEOLOGY

Subsurface conditions in the vicinity of the site were evaluated by reviewing the *Geologic Map of the Wenatchee 1:100,000 Quadrangle, Washington* (Tabor, et al., 1982). Based on our review, the primary geologic unit at the site is mainstream alluvium of the Yakima River (Geologic Map Unit *Qlbm*). According to the geologic map, this soil unit consists of mixed-lithology cobble gravel forming a distinct terrace about 165 feet above the Yakima River in the project vicinity. This soil unit is capped by a discontinuous mantle of loess (wind-blown silt).

CURRENT TEST PIT EXCAVATIONS

Five test pits (TP-1 through TP-5) were excavated at the subject site on June 25, 2024, to evaluate subsurface conditions. The approximate test pit locations are indicated in Figure 2. The test pits were excavated up to 9 feet below the existing ground surface using a Kubota U27 rubber tracked mini-excavator owned and operated by Tamarack Trail Builders of Roslyn, Washington. The field exploration was overseen by a geologist with our firm who logged and sampled the soils encountered in the test pits.

The soils were logged in general accordance with the system summarized on Figure A-1 of Appendix A, Terms and Symbols for Boring and Test Pit Logs. The summary test pit logs are included as Figures A-2 through A-6 in Appendix A and provide descriptions of the materials encountered, depths to soil contacts, and depths of seepage or caving, if

present. The relative in-situ density of cohesionless soils, or the relative consistency of fine-grained soils, was estimated from the excavating action of the excavator, and the stability of the test pit sidewalls. Where soil contacts were gradual or undulating, the average depth of the contact was recorded on the log.

The test pits excavated for this study were backfilled with the excavated soils after the soils were logged. The backfill was tamped with the excavator bucket and the ground surface leveled. The backfill was not compacted to a dense condition for structural support. During construction of the project, the earthwork contractor should locate the test pits, remove the loose backfill and replace it with properly compacted structural fill if the test pits are located in load-bearing structural areas.

EXISTING NEARBY SUBSURFACE INFORMATION

In addition to our test pits completed for this study, we also reviewed logs of previous test borings and groundwater elevation data for the Sportland Mini-Mart site (4400 Bullfrog Road) located approximately 300 feet north of the subject site (Fulcrum, 2013). Previous test borings at the Sportland Mini-Mart site extended between approximately 17½ and 45 feet below the ground surface. Discussion of the subsurface conditions reported on the previous test boring logs is included in the following sections.

LABORATORY TESTING

Grain size distribution tests were conducted on select representative soil samples obtained from the test pits. The grain size distribution tests were performed according to ASTM D1140. The test results are noted on the test pit logs in Appendix A, where appropriate. The grain size distribution test results are also plotted and included in Appendix B.

Laboratory tests were also performed to determine the Cation Exchange Capacity (CEC) and percent organic matter of select soil samples. The CEC tests were performed using USEPA Method 9081 and the organic matter tests were performed using the Walkley-Black method. The results are presented in the *Treatment Capacity Classification* section of this report, and the raw laboratory test data is included in Appendix C.

SITE SOIL CONDITIONS

The following is a summary description of the soil conditions encountered at our test pit locations. For a detailed description of the subsurface conditions encountered at our exploration locations, please refer to the attached test pit logs in Appendix A. The stratigraphic contacts indicated on the test pit logs represent the approximate depth to boundaries between soil units. Actual transitions between soil units may be more gradual or occur at different elevations. The descriptions of groundwater conditions and depths are likewise approximate.

Fill: At test pit TP-2, a layer of loose to medium dense silty sand with gravel interpreted as existing fill was encountered to about 3 feet below grade. In addition, a 6- to 9-inch-thick surficial layer of crushed gravel fill material was encountered at the ground surface at test pits TP-3 and TP-4.

Loess: Underlying the fill at test pits TP-3 and TP-4, and near the ground surface at TP-5, loose to medium dense silty fine sand to sandy silt that we interpret to be loess was encountered. The loess was encountered to about 2 feet below grade at test pits TP-3 and TP-4 and to about 4 feet below grade at TP-5. This soil unit was not encountered at the remaining test pit locations.

Mainstream Alluvium: Underlying the existing fill at TP-2, the loess at TP-3 to TP-5 and near the ground surface at TP-1, loose to dense poorly to well graded gravel with a varying silt and sand content was encountered to the maximum depths explored. The upper roughly 1½ to 4½ feet of this soil unit was typically weathered and had a slightly higher fines content. This soil unit is interpreted as mainstream alluvium which is consistent with the geologic mapping of the area. This soil unit contained numerous to abundant cobbles and occasional small boulders. This soil unit was encountered to the maximum exploration depth of up to 9 feet below grade at our test pit locations.

Based on review of the previous test borings advanced at the Sportland Mini-Mart site, materials interpreted as mainstream alluvium were encountered to greater than 20 feet below the ground surface.

GROUNDWATER

Groundwater or seepage was not encountered in the test pits at the time of excavation. Furthermore, monitoring well MW-07 at the Sportland Mini-Mart property was installed near the south property line and is the closest previous subsurface exploration to the subject site. The well casing at MW-07 extended approximately 45 feet below the ground surface and in November 2012, the groundwater table was not encountered in this well.

The designers and contractors should be aware there will be fluctuations in groundwater conditions depending on the season, amount of rainfall, surface water runoff, and other factors. Generally, the water level is higher and seepage rates are greater in the wetter, winter months (typically October through May).

FIELD INFILTRATION TESTING

The field infiltration test was conducted in general accordance with the procedure for the small-scale pilot infiltration test (PIT) as outlined in the *Stormwater Management Manual for Eastern Washington* (SMMEW, WSDOE, 2019). The location of the small-scale PIT was based on input from the project Civil Engineer. In general, the test consisted of the following procedure:

- A test pit was excavated to the approximate design bottom of the proposed infiltration facility with a minimum bottom area of 12 square feet.
- The test pit was pre-soaked by maintaining a water level of at least 6 to 12 inches above the bottom of the pit.
- At the end of the pre-soak period, a flow meter was used to monitor the amount of water needed to maintain a constant head of 6 to 12 inches for at least one hour and until at least a point at which a constant volume of water per time unit was achieved.
- At the end of the constant head test, we measured the falling head infiltration rate by shutting off the water flow and recording the drop in water level over regular time intervals for (typically) one hour, or until all the water was infiltrated.

The field infiltration rate was then calculated based on the final measured volume per time unit, and the surface area of the pit. The results of our tests are summarized in Table 1, following page.

TABLE 1 – FIELD INFILTRATION TEST RESULTS

Test Location/Depth	Pre-Soak Duration (hours)	Test Stage	K_{sat} initial (inches/hour)	Soils
PIT-1 at 5 feet	6	Constant Head	9.2	Poorly graded GRAVEL with silt and sand (Mainstream Alluvium)
		Falling Head	5.4	

DESIGN INFILTRATION RATE

Three partial correction factors are then applied to K_{sat} initial value listed in Table 1, as outlined in the SMMEW, to estimate the long-term design infiltration rate as discussed below.

- **Site Variability**: The correction factor for site variability (CF_v) is selected based on the number of locations tested and the consistency of the underlying soil conditions and ranges from 0.33 to 1.0 (no correction factor). Based on our experience and engineering judgment, we recommend a correction factor of 0.6 for site variability.

- **Test Method**: The test method correction factor (CF_t) is intended to account for the uncertainty of the test method and the scale of test versus the size of the facility. A correction factor of CF_t = 0.5 was applied based on using the small-scale PIT method.

- **Influent Control**: An influent control correction factor (CF_m) of 0.9 was to account for a reduction in infiltration capacity due to clogging from siltation and the build-up of biological material.

Based on the discussions above, a total correction factor of 0.27 (i.e., CF_v x CF_t x CF_m = 0.6 x 0.5 x 0.9 = 0.27) was applied to the K_{sat} initial value to get the estimated long-term design infiltration rates (i.e., K_{sat} design) presented in Table 2, on the following page.

TABLE 2 -- DESIGN INFILTRATION RATE

Test Location/Depth	Field Infiltration Rate (K_{sat} initial) (inches/hour)	Long-Term Design Infiltration Rate (K_{sat} design) (inches/hour)
PIT-1 at 5 feet	9.2	2.5

GROUNDWATER SEPARATION (SSC-5)

Site Suitability Criteria 5 (SSC-5) in Chapter 5.4 of the SMMEW recommends a minimum 5-foot separation between the bottom of infiltration basins or infiltration trench systems and the seasonal high groundwater level. Groundwater was not encountered within the maximum exploration depths of up to 9 feet below grade at the time of test pit excavation in June 2024. Furthermore, groundwater was not encountered within the approximately 45-foot-deep monitoring well MW-07 at the nearby Sportland Mini-Mart site in November 2012. Therefore, it is our opinion that the DOE groundwater separation requirement would be met.

TREATMENT CAPACITY CLASSIFICATION (SSC-6)

Site Suitability Criteria 6 (SSC-6) in Chapter 5.4 of the SMMEW states that cation exchange capacity (CEC) of the soils directly below the bottom of an infiltration facility must be ≥5 milliequivalents (meq) CEC per 100 grams (g) dry soil. If the treatment soils do not meet this CEC requirement, appropriate mitigation measures must be implemented. CEC tests were performed on mainstream alluvium samples collected from the test pits. The laboratory test results from CEC tests are summarized in Table 3 on the following page and the analytical laboratory test results are included in Appendix C.

TABLE 3 – CEC AND ORGANIC MATTER LAB TEST RESULTS

Test Pit Location	Soil Sample Depth (feet below grade)	Cation Exchange Capacity (meq/100g)	Organic Content
TP-1	5'	6.9	0.8
TP-3	5'	5.8	0.6
TP-3	8'	8.6	0.4
TP-5	6'	4.8	0.4

INFILTRATION CONCLUSIONS

Based on the in-situ infiltration test results at PIT-1 and the applied correction factors, it is our opinion that a design infiltration rate of 2.5 inches per hour would be appropriate to size an infiltration facility at that location. Furthermore, based on geotechnical laboratory testing of representative mainstream alluvium samples collected from 5 feet below grade at TP-1 (PIT-1), 5 feet and 8 feet below grade at test pit TP-3, and 6 feet below grade at TP-5, the grain size distribution curves are quite consistent. Therefore, it is our opinion that the recommended design infiltration rate of 2.5 inches per hour would be appropriate for mainstream alluvium deposits located 5 feet below grade or deeper at the site.

CONSTRUCTION CONSIDERATIONS

Infiltration facilities are post-construction facilities which are designed to improve the quality and manage the volume of stormwater runoff by encouraging natural infiltration on-site. In order to protect the infiltration receptor soils from becoming clogged with sediment and/or compacted during construction, we recommend the following measures be implemented during construction:

- The infiltration facilities should be constructed as late in the schedule as feasible and should not be constructed until after the upstream areas are stabilized.

- Heavy equipment traffic on prepared subgrades should be limited, especially during wet weather.
- If fine grained sediment is deposited or tracked onto the infiltration system subgrade, it should be removed using an excavator with a grade plate, small dozer, or vacuum truck.
- The subgrade should be scarified prior to placing fill to prevent sealing of the receptor soils.
- Structural fill and aggregate base materials should be end-dumped at the edge of the fill area and the material pushed out over the subgrade.
- Grading of the infiltration galleries should be accomplished using low-impact earth-moving equipment to prevent compaction of the underlying soils. Wide tracked vehicles such as back hoes, small dozers and bobcats are suggested.

Furthermore, infiltration facilities should be located as far away as possible from any footings and basements to avoid water migration into adjacent structures and long terms settlement of foundation soils.

PanGEO should be retained during construction to observe excavations of infiltration facilities to confirm the infiltration facilities are constructed in the intended soil unit.

LIMITATIONS

We have prepared this report for use by Kamiak and the project team. Recommendations contained in this report are based on a site reconnaissance, subsurface exploration and laboratory testing programs, review of pertinent subsurface information, and our understanding of the project. The study was performed using a mutually agreed-upon scope of work.

This report may be used only by the client and for the purposes stated, within a reasonable time from its issuance. Land use, site conditions (both off and on-site), or other factors including advances in our understanding of applied science, may change over time and could materially affect our findings. Therefore, this report should not be relied upon after 24 months from its issuance. PanGEO should be notified if the project is delayed by more

than 24 months from the date of this report so that we may review the applicability of our conclusions considering the time lapse.

Within the limitation of scope, schedule, and budget, PanGEO engages in the practice of geotechnical engineering and endeavors to perform its services in accordance with generally accepted professional principles and practices at the time the Report or its contents were prepared. No warranty, express or implied, is made.

We trust that the information outlined in this letter meets your needs at this time. Please call if you have any questions.

Sincerely,

PanGEO, Inc.

HONGBO MICHAEL XUE
STATE OF WASHINGTON
35016
REGISTERED
PROFESSIONAL ENGINEER
11/21/2024

Steven T. Swenson, L.G.
Senior Geologist

H. Michael Xue, P.E.
Principal Geotechnical Engineer

ENCLOSURES

Figure 1	Vicinity Map
Figure 2	Site and Exploration Plan
Appendix A	**Summary Test Pit Logs**
Figure A-1	Terms and Symbols for Boring and Test Pit Logs
Figure A-2	Log of Test Pit TP-1 (PIT-1)
Figure A-3	Log of Test Pit TP-2
Figure A-4	Log of Test Pit TP-3
Figure A-5	Log of Test Pit TP-4
Figure A-6	Log of Test Pit TP-5
Appendix B	**Geotechnical Laboratory Test Results**
Figure B-1	Grain Size Distribution
Appendix C	**Analytical Laboratory Testing Results**
	Cation Exchange Capacity and Organic Matter Testing Results (4 pages)

REFERENCES

Fulcrum Environmental Consulting, 2013, *Remedial Investigation and Characterization Report, Sportland Mini-Mart, 4400 Bullfrog Road, Cle Elum, Washington.* Consultant report prepared for Sportland Project, LLC dated January 23, 2013.

Gulick, Charles W., Korosec, Michael A., compilers, 1990, *Geologic Map of the Omak 1:100,000 Quadrangle, Washington*: Washington Division of Geology and Earth Resources Open File Report 90-10, 52 p., 1 plate.

Washington State Department of Ecology, 2019, *Stormwater Management Manual for Eastern Washington* Publication.

Base map modified from ESRI topographic imagery.

Not to Scale

PanGEO INCORPORATED	**Bullfrog Apartments** **4240 Bullfrog Road** **Cle Elum, WA**	**VICINITY MAP** Project No. **24-228** Figure No. **1**

Notes: Base map obtained from Google Earth. Proposed building layout 'Option B'.

Legend:
Approximate Test Pit Location

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Bullfrog Apartments
4240 Bullfrog Road
Cle Elum, WA

SITE AND EXPLORATION PLAN

Project No. 24-228

Figure No. 2

APPENDIX A

SUMMARY TEST PIT LOGS

RELATIVE DENSITY / CONSISTENCY

SAND / GRAVEL			SILT / CLAY		
Density	SPT N-values	Approx. Relative Density (%)	Consistency	SPT N-values	Approx. Undrained Shear Strength (psf)
Very Loose	<4	<15	Very Soft	<2	<250
Loose	4 to 10	15 - 35	Soft	2 to 4	250 - 500
Med. Dense	10 to 30	35 - 65	Med. Stiff	4 to 8	500 - 1000
Dense	30 to 50	65 - 85	Stiff	8 to 15	1000 - 2000
Very Dense	>50	85 - 100	Very Stiff	15 to 30	2000 - 4000
			Hard	>30	>4000

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS		GROUP DESCRIPTIONS	
Gravel 50% or more of the coarse fraction retained on the #4 sieve. Use dual symbols (eg. GP-GM) for 5% to 12% fines.	GRAVEL (<5% fines)	GW	Well-graded GRAVEL
		GP	Poorly-graded GRAVEL
	GRAVEL (>12% fines)	GM	Silty GRAVEL
		GC	Clayey GRAVEL
Sand 50% or more of the coarse fraction passing the #4 sieve. Use dual symbols (eg. SP-SM) for 5% to 12% fines.	SAND (<5% fines)	SW	Well-graded SAND
		SP	Poorly-graded SAND
	SAND (>12% fines)	SM	Silty SAND
		SC	Clayey SAND
Silt and Clay 50%or more passing #200 sieve	Liquid Limit < 50	ML	SILT
		CL	Lean CLAY
		OL	Organic SILT or CLAY
	Liquid Limit > 50	MH	Elastic SILT
		CH	Fat CLAY
		OH	Organic SILT or CLAY
Highly Organic Soils		PT	PEAT

Notes:

1. Soil exploration logs contain material descriptions based on visual observation and field tests using a system modified from the Uniform Soil Classification System (USCS). Where necessary laboratory tests have been conducted (as noted in the "Other Tests" column), unit descriptions may include a classification. Please refer to the discussions in the report text for a more complete description of the subsurface conditions.

2. The graphic symbols given above are not inclusive of all symbols that may appear on the borehole logs. Other symbols may be used where field observations indicated mixed soil constituents or dual constituent materials.

DESCRIPTIONS OF SOIL STRUCTURES

Layered: Units of material distinguished by color and/or composition from material units above and below

Laminated: Layers of soil typically 0.05 to 1mm thick, max. 1 cm

Lens: Layer of soil that pinches out laterally

Interlayered: Alternating layers of differing soil material

Pocket: Erratic, discontinuous deposit of limited extent

Homogeneous: Soil with uniform color and composition throughout

Fissured: Breaks along defined planes

Slickensided: Fracture planes that are polished or glossy

Blocky: Angular soil lumps that resist breakdown

Disrupted: Soil that is broken and mixed

Scattered: Less than one per foot

Numerous: More than one per foot

BCN: Angle between bedding plane and a plane normal to core axis

COMPONENT DEFINITIONS

COMPONENT	SIZE / SIEVE RANGE	COMPONENT	SIZE / SIEVE RANGE
Boulder:	> 12 inches	Sand	
Cobbles:	3 to 12 inches	Coarse Sand:	#4 to #10 sieve (4.5 to 2.0 mm)
Gravel		Medium Sand:	#10 to #40 sieve (2.0 to 0.42 mm)
Coarse Gravel:	3 to 3/4 inches	Fine Sand:	#40 to #200 sieve (0.42 to 0.074 mm)
Fine Gravel:	3/4 inches to #4 sieve	Silt	0.074 to 0.002 mm
		Clay	<0.002 mm

TEST SYMBOLS

for In Situ and Laboratory Tests listed in "Other Tests" column.

ATT	Atterberg Limit Test
Comp	Compaction Tests
Con	Consolidation
DD	Dry Density
DS	Direct Shear
%F	Fines Content
GS	Grain Size
Perm	Permeability
PP	Pocket Penetrometer
R	R-value
SG	Specific Gravity
TV	Torvane
TXC	Triaxial Compression
UCC	Unconfined Compression

SYMBOLS

Sample/In Situ test types and intervals

- 2-inch OD Split Spoon, SPT (140-lb. hammer, 30" drop)
- 3.25-inch OD Spilt Spoon (300-lb hammer, 30" drop)
- Non-standard penetration test (see boring log for details)
- Thin wall (Shelby) tube
- Grab
- Rock core
- Vane Shear

MONITORING WELL

- Groundwater Level at time of drilling (ATD)
- Static Groundwater Level
- Cement / Concrete Seal
- Bentonite grout / seal
- Silica sand backfill
- Slotted tip
- Slough
- Bottom of Boring

MOISTURE CONTENT

Dry	Dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water

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Terms and Symbols for Boring and Test Pit Logs

Figure A-1

Test Pit Logs

Project No: 24-228
Project Name: Bullfrog Apartments, Cle Elum, WA
Date Excavated: 06/25/2024

Test Pit No. TP-1 (PIT-1)

Location: See Figure 2

Approximate ground surface elevation: 2,127 feet

Depth (ft)	Material Description
0 – 4.5	Loose to medium dense, brown, silty SAND with gravel to silty GRAVEL with sand, dry to moist. Weathered. **[Mainstream Alluvium]** • Abundant roots to about 3 feet, slight caving
4.5 – 9	Medium dense to dense, brown, poorly graded GRAVEL with silt and sand, moist. • Small-scale Pilot Infiltration Test conducted about 5 feet below grade • **Sample at 5:** 5.0% fines (GP-GM) • Numerous cobbles, occasional small boulders • Minor caving

Left Photo: Tape measure at about 5 feet below grade. **Right Photo:** Infiltration test in progress.

TP-1 was terminated approximately 9 feet below grade at the conclusion of infiltration testing. Groundwater was not encountered at the time of excavation.

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Figure A-2

Test Pit Logs

Project No: 24-228
Project Name: Bullfrog Apartments, Cle Elum, WA
Date Excavated: 06/25/2024

Test Pit No. TP-2

Location: See Figure 2

Approximate ground surface elevation: 2,127 feet

Depth (ft)	Material Description
0 – 3	Loose to medium dense, brown, silty SAND with gravel, dry to moist. **[Fill]** • Thin layer of gray crushed rock around 1.5 feet
3 – 5	Medium dense, brown, silty SAND with gravel, moist. Weathered. **[Mainstream Alluvium]** • Occasional cobbles
5 – 7	Medium dense to dense, brown, poorly graded GRAVEL with silt and sand, moist. • Numerous cobbles, occasional small boulders

Photo: Test pit around 5 feet deep.

TP-2 was terminated approximately 7 feet below grade. Groundwater was not encountered at the time of excavation.

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Figure A-3

Test Pit Logs

Project No: 24-228
Project Name: Bullfrog Apartments, Cle Elum, WA
Date Excavated: 06/25/2024

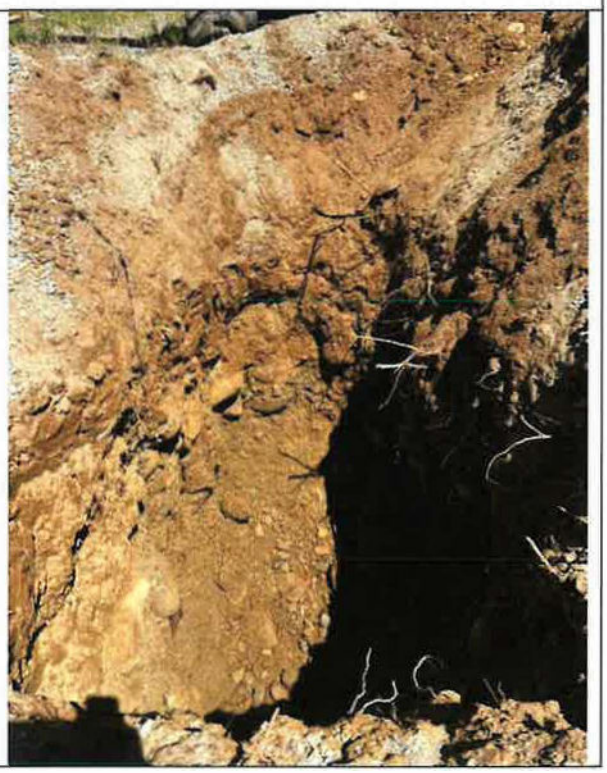
Test Pit No. TP-3

Location: See Figure 2

Approximate ground surface elevation: 2,124 feet

Depth (ft)	Material Description
0 – 0.5	Loose, gray, poorly graded GRAVEL with silt and sand, dry. Crushed gravel. **[Fill]**
0.5 – 2	Loose to medium dense, brown, silty fine SAND to sandy SILT, moist, **[Loess]** • Numerous roots
2 – 3.5	Medium dense to dense, brown, poorly graded GRAVEL with silt and sand, moist. **[Mainstream Alluvium]** • Numerous cobbles, occasional small boulders
3.5 – 9	Dense, brown, well to poorly graded GRAVEL with sand, moist. • Numerous cobbles, occasional small boulders • **Sample at 5':** 4.4% fines (GW) • **Sample at 8.5':** 4.1% fines (GP)

Photo: Test pit around 7 feet deep.



TP-3 was terminated approximately 9 feet below grade due to practical excavation refusal on a boulder. Groundwater was not encountered at the time of excavation.

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Figure A-4

Test Pit Logs

Project No: 24-228
Project Name: Bullfrog Apartments, Cle Elum, WA
Date Excavated: 06/25/2024

Test Pit No. TP-4

Location: See Figure 2

Approximate ground surface elevation: 2,126 feet

Depth (ft)	Material Description
0 – 0.75	Loose, gray, poorly graded GRAVEL with silt and sand, dry. Crushed gravel. **[Fill]**
0.75 – 2	Loose to medium dense, silty fine SAND to sandy SILT, dry to moist, **[Loess]** • Numerous roots • **Sample at 1.5':** 47.0% fines (SM)
2 – 4	Medium dense to dense, brown, silty GRAVEL with sand, dry to moist. **[Mainstream Alluvium]** • Numerous cobbles, occasional small boulders
4 – 8	Medium dense to dense, brown, well to poorly graded GRAVEL with sand, moist. • Numerous cobbles, occasional small boulders

Photo: Completed test pit.

TP-4 was terminated approximately 8 feet below grade. Groundwater was not encountered at the time of excavation.

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Figure A-5

Test Pit Logs

Project No: 24-228
Project Name: Bullfrog Apartments, Cle Elum, WA
Date Excavated: 06/25/2024

Test Pit No. TP-5

Location: See Figure 2

Approximate ground surface elevation: 2,126 feet

Depth (ft)	Material Description
0 – 4	Loose to medium dense, silty fine SAND to sandy SILT, dry to moist, **[Loess]** • Numerous roots
4 – 6.5	Medium dense to dense, brown, poorly graded GRAVEL with silt and sand, moist. **[Alluvium]** • Numerous cobbles, occasional small boulders • **Sample at 6':** 5.5% fines

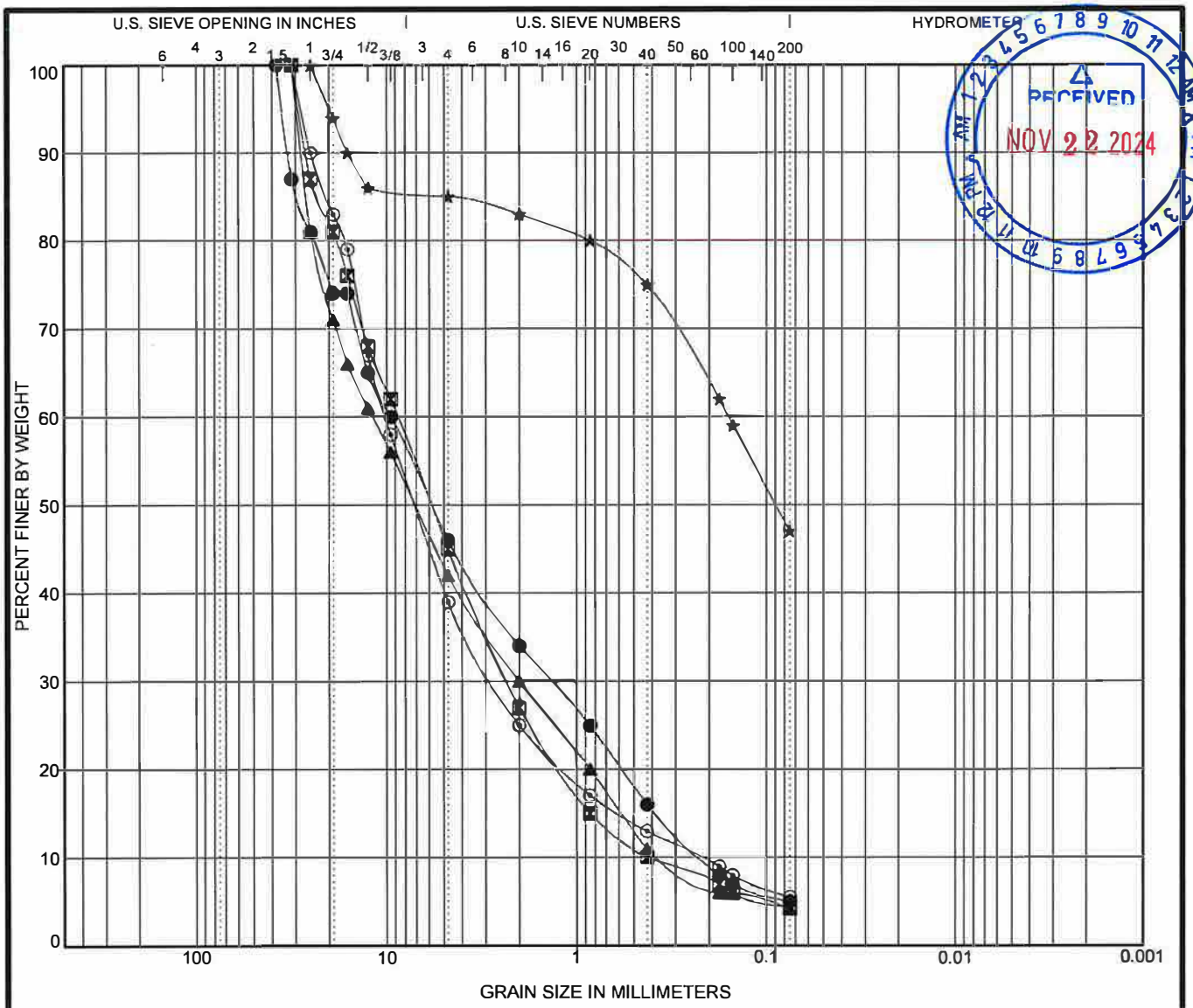
Photo: Test pit at 5 feet.

TP-5 was terminated approximately 6.5 feet below grade. Groundwater was not encountered at the time of excavation.

Logged by: S Swenson

APPENDIX B

GEOTECHNICAL LABORATORY TEST RESULTS



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	TP-1	@ 5.0 ft.	POORLY GRADED GRAVEL with SILT and SAND(GP-GM)	NP	NP	NP	0.89	43.23
⊠	TP-3	@ 5.0 ft.	WELL-GRADED GRAVEL with SAND(GW)	NP	NP	NP	1.43	20.65
▲	TP-3	@ 8.5 ft.	POORLY GRADED GRAVEL with SAND(GP)	NP	NP	NP	0.95	33.19
★	TP-4	@ 1.5 ft.	SILTY SAND with GRAVEL(SM)	NP	NP	NP		
⊙	TP-5	@ 6.0 ft.	POORLY GRADED GRAVEL with SILT and SAND(GP-GM)	NP	NP	NP	3.33	45.92

	Specimen Identification		D100	D90	D60	D10	%Gravel	%Sand	%Silt	%Clay
●	TP-1	5.0	38	32.894	9.525	0.22	54.0	41.0	5.0	
⊠	TP-3	5.0	31.5	26.37	8.776	0.425	55.0	40.6	4.4	
▲	TP-3	8.5	31.5	27.892	11.839	0.357	58.0	37.9	4.1	
★	TP-4	1.5	25	16	0.159		15.0	38.0	47.0	
⊙	TP-5	6.0	31.5	25	10.118	0.22	61.0	33.5	5.5	

GRAIN SIZE 24-228 BULLFROG, CLE ELUM LAB.GPJ PANGEO.GDT 11/21/24

PanGEO INCORPORATED
Phone: 206.262.0370

GRAIN SIZE DISTRIBUTION

Project: Bullfrog Apartments
Job Number: 24-228
Location: 4240 Bullfrog Road, Cle Elum, WA

Figure B-1

APPENDIX C

ANALYTICAL LABORATORY TEST RESULTS

Soil PAP NAPT 2023

soiltest farm consultants, inc.

2925 Driggs Dr., Moses Lake, Wa 98837 · www.soiltestlab.com
Office: (509)765-1622 · Fax:(509)765-0314 · (800)764-1622

Soil & Plant Program 2024 NAPT Participating Laboratory

PANGEO	Date Received: 7/2/2024
3213 EASTLAKE AVE EAST SUITE B	Grower: BULLFROG RD CLE ELUM
	Field: TP-1 AT5
SEATTLE , WA 98102	Sampled By:
Laboratory #: S24-12262	Customer Account #:
Soil Test Results	Customer Sample ID:

Cation Exchange	CEC	meq/100g	6.9	pH 1:1			
				E.C. 1:1	m.mhos/cm		
				Est Sat Paste E.C.	m.mhos/cm		
				Effervescence			
							Lbs/Acre
				Ammonium - N	mg/kg		
				Organic Matter W.B.	%	0.8	ENR: 16

Other Tests:

RECEIVED NOV 22 2024

We make every effort to provide an accurate analysis of your sample. For reasonable cause we will repeat tests, but because of factors beyond our control in sampling procedures and the inherent variability of soil, our liability is limited to the price of the tests. Recommendations are to be used as general guides and should be modified for specific field conditions and situations. Note: "u" indicates that the element was analyzed for but not detected

This is your Invoice #: S24-12262 Account #: 261400 Reviewed by: K. Bair, PhD, C List Cost: $32.00

Soil PAP NAPT 2023

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Soil & Plant Program 2024 NAPT Participating Laboratory

PANGEO
3213 EASTLAKE AVE EAST SUITE B

SEATTLE , WA 98102
Laboratory #: S24-12263

Date Received: 7/2/2024
Grower: BULLFROG RD CLE ELUM
Field: TP-3 AT 5
Sampled By:
Customer Account #:
Customer Sample ID:

Soil Test Results

Cation Exchange	CEC	meq/100g	5.8	pH 1:1		
				E.C. 1:1	m.mhos/cm	
				Est Sat Paste E.C.	m.mhos/cm	
				Effervescence		
						Lbs/Acre
				Ammonium - N	mg/kg	
				Organic Matter W.B.	%	0.6 ENR: 11

Other Tests:

RECEIVED NOV 22 2024

We make every effort to provide an accurate analysis of your sample. For reasonable cause we will repeat tests, but because of factors beyond our control in sampling procedures and the inherent variability of soil, our liability is limited to the price of the tests. Recommendations are to be used as general guides and should be modified for specific field conditions and situations. Note: "u" indicates that the element was analyzed for but not detected

This is your Invoice #: S24-12263 Account #: 261400 Reviewed by: K. Bair, PhD, C List Cost: $32.00

Soil PAP NAPT 2023

soiltest farm consultants, inc.

2925 Driggs Dr., Moses Lake, Wa 98837 - www.soiltestlab.com
Office: [509]765-1822 - Fax:[509]765-0314 - [800]784-1822

Soil & Plant Program 2024 NAPT Participating Laboratory

PANGEO
3213 EASTLAKE AVE EAST SUITE B

SEATTLE , WA 98102
Laboratory #: S24-12264

Date Received: 7/2/2024
Grower: BULLFROG RD CLE ELUM
Field: TP-3 AT 8.5
Sampled By:
Customer Account #:
Customer Sample ID:

Soil Test Results

Cation Exchange	CEC	meq/100g	8.6	pH 1:1		
				E.C. 1:1	m.mhos/cm	
				Est Sat Paste E.C.	m.mhos/cm	
				Effervescence		
						Lbs/Acre
				Ammonium - N	mg/kg	
				Organic Matter W.B.	%	0.4 ENR: 8

Other Tests:

RECEIVED NOV 22 2024

We make every effort to provide an accurate analysis of your sample. For reasonable cause we will repeat tests, but because of factors beyond our control in sampling procedures and the inherent variability of soil, our liability is limited to the price of the tests. Recommendations are to be used as general guides and should be modified for specific field conditions and situations. Note: "u" indicates that the element was analyzed for but not detected

This is your Invoice #: S24-12264 Account #: 261400 Reviewed by: K. Bair, PhD, C List Cost: $32.00

Soil PAP NAPT 2023

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Soil & Plant Program 2024 NAPT Participating Laboratory

PANGEO
3213 EASTLAKE AVE EAST SUITE B

SEATTLE , WA 98102
Laboratory #: S24-12265

Date Received: 7/2/2024
Grower: BULLFROG RD CLE ELUM
Field: TP-5 AT 6
Sampled By:
Customer Account #:
Customer Sample ID:

Soil Test Results

Cation Exchange	CEC	meq/100g	4.8	pH 1:1		
				E.C. 1:1	m.mhos/cm	
				Est Sat Paste E.C.	m.mhos/cm	
				Effervescence		
						Lbs/Acre
				Ammonium - N	mg/kg	
				Organic Matter W.B.	%	0.4 ENR: 8

Other Tests:

RECEIVED NOV 22 2024

We make every effort to provide an accurate analysis of your sample. For reasonable cause we will repeat tests, but because of factors beyond our control in sampling procedures and the inherent variability of soil, our liability is limited to the price of the tests. Recommendations are to be used as general guides and should be modified for specific field conditions and situations. Note: "u" indicates that the element was analyzed for but not detected

This is your Invoice #: S24-12265 Account #: 261400 Reviewed by: K. Bair, PhD, C List Cost: $32.00